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ABSTRACT

Adult education and distance education are two of the fastest growing segments of the education market. Technological and procedural improvements need to be focused concurrently on three domains: course delivery technologies, course/program administration and course content. Delivery technologies, such as satellite, CATV, CD and World Wide Web, are perhaps the most visible area of change. Administrative procedures can benefit from both process re-engineering and emerging technologies such as the World Wide Web, touch-tone, speech recognition and facsimile (fax). Improvements in course content have the potential to benefit both traditional and non-traditional students. The Lockheed Martin Engineering Management Program at the University of Colorado, which has grown over the span of a decade to serve on-campus, live video and videotape students across the country and around the world, serves as an example of both progress that is possible in these areas and of the improvement opportunities yet to exist. Contains 14 references. (Author/AEF)

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Enabling Technologies for Adult Distance Learners

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Abstract: Adult education and distance education are two of the fastest growing segments of the education market. Technological and procedural improvements need to be focused concurrently on three domains: course delivery technologies, course/program administration and course content. Delivery technologies, such as satellite, CATV, CD and World Wide Web, are perhaps the most visible area of change. Administrative procedures can benefit from both process re-engineering and emerging technologies such as WWW, touch-tone, speech recognition and FAX. Improvements in course content have the potential to benefit both traditional and non-traditional students. The Lockheed Martin Engineering Management Program at the University of Colorado serves as an example of both progress that is possible in these areas and of the improvement opportunities that yet exist.

Introduction

The Lockheed Martin Engineering Management Program at the University of Colorado is celebrating its tenth anniversary. The program was originally chartered by Martin Marietta to provide professional and graduate education over live one-way video, two-way audio links. Over the span of a decade, the program has grown to serve on-campus, live video and video tape students across the country and around the world. The program has a vital interest in the junctions of distance education and adult learner theory and practice.

There is currently a rush by colleges and universities to implement distance education [Sherron and Boettcher 1997]. After decades of steady, unspectacular growth, adult education has seen explosive growth in recent years [Merriam and Brockett 1997]. Adult education, or andragogy, is the fastest growing segment of the education market [Bedensteiner, 1989]. To fully realize the potential of distance education for adult learners, advances must be made simultaneously on three fronts. First, improvements are required of the distance education (DE) delivery technologies. Also, administration of these programs must remove unnecessary barriers for distant adult students. Finally, the quality of the course content delivered by these new technologies must improve.

Delivery Technology

The capabilities of emerging DE delivery technologies, particularly bandwidth and ease-of-use, must increase to fully realize the potential benefits. These technologies need to be more affordable in order to realize the promise of broad-based access to life-long learning. Standards must emerge among DE technologies to reduce the risk of purchase. The emergence of standards will tend to facilitate the desired outcome of lower costs [Moore 1993]. However, adoption of standards tends to inhibit the development of new features and capabilities [ibid.]. In weighing the trade-offs between technology capability and student access to technology, the Lockheed Martin Engineering Management Program currently requires video tape player access (typically, but not necessarily VHS) and 28.8K dial-up Internet access as minimum technology requirement standards for

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students enrolled in the program. These standards are evaluated as a function of two criteria. First, the affordability, availability and standardization of new delivery technologies is considered. Second, changes in course content may drive new delivery technology requirements. This second consideration suggests that the delivery technology and course content domains are not mutually exclusive.

When properly executed, distance education promises several benefits [Porter 1997]. Distance education can provide greater educational opportunity for a more diverse student population and students should be able to utilized their preferred mode of learning. Distance education has the potential to promote more teacher-to-student, and especially, student-to-teacher and student-to-student information sharing. DE delivery technologies can enable greater interaction outside of normal class hours. Distance education ought to encourage both student and instructor exposure to new technologies.

Adult learners are more diverse in many regards [St. Pierre 1990], so they should benefit to the extent that DE provides greater opportunity to a more diverse student base. Adult learners prefer self-directed, self-paced instruction [Zemke and Zemke 1982] and they stand to benefit if the DE delivery technology enables them to utilize this preferred mode of learning. Adult learners want to share their relevant life experience and often desire contact outside of normal class hours [ibid.], so the intersection of distance education and adult learning appears to hold much promise.

Of the DE benefits cited by [Porter 1997], only the exposure to new technologies poses a potential barrier to andragogy. Adult learners are less likely to tolerate discomfort in the learning environment [Zemke and Zemke 1982]. They are less tolerant of trial-and-error learning experiences, tend to take mistakes more personally, have trouble integrating more than one new concept at a time, expect new material to be immediately relevant to their situation, and desire to have new material be consistent with what they already know [ibid.]. Therefore, what is seen as a beneficial characteristic of DE in the context of pedagogy can inhibit adult learners. This problem is particularly acute with CD- and web-based hypermedia because there are no widely accepted principles for organizing the multi-dimensional electronic information space [Bevirt 1996].

Professors in the Lockheed Martin Engineering Management Program employ consistent means for organizing and navigating hypermedia instructional aids on the program web site. First, the program curriculum web site (http://www.colorado.edu/EngMgmtProg/courses/) is organized sequentially by course number with hierarchical links to course pages. All courses in the degree program have such a course page. Not all courses provide every category of instructional aid, but aids that are present within a given course are hyperlinked in a sequence which is consistent between courses. The proposed organization of material within a given lesson or instructional unit is covered in detail below.

Administration

[Bedensteiner 1989] has identified administrative barriers for adult learners. These include inflexible course scheduling, complex registration processes and a lack of openings for non-traditional students in traditional classes. DE technologies have the potential to increase the flexibility of course content delivery and free students from the constraints of time and space [Porter, 1997]. Simplified registration processes, allocation of course openings for adult learners, and special orientation sessions for adult students are recommended to help overcome these barriers [Bedensteiner 1989].

Numerous barriers have been identified in the administration and staffing of distance education programs [Olcott 1996]. Residency requirements for distant students seeking degrees form a significant barrier to distance education. Many programs are plagued by a lack of resources particularly, but not exclusively, infrastructure resources. Disputes as to whether faculty efforts with respect to DE programs are inload or overload activities hamper the implementation of distance programs. Faculty are reluctant to participate in DE

programs because of concern about applicability toward promotion and tenure. Faculty express concern about a loss of control, both of their perceived intellectual property due to new distribution technologies, and loss of instructional control as specialists such as program directors and multimedia programmers become more integral in course delivery.

The Lockheed Martin Engineering Management Program is centrally administered through the Center for Advanced Training in Engineering and Computer Science (CATECS) in the College of Continuing Education at the University of Colorado. CATECS is chartered with providing the infrastructure resources to successfully deliver distance education programs. CATECS provides a simplified, one-stop interface for students to other University services and administration including registrar, bursar and book store. The majority of CATECS students are adult distance students, so they receive top priority in course enrollment. The Lockheed Martin Engineering Management Program conducts a special orientation session annually for new entrants.

In their last semester of enrollment, degree-bound students are transferred from Continuing Education to the Graduate School and their residency requirements are waived. The University of Colorado is in the final stages of approving a collegiate professor career track that is specifically designed to foster the career development of faculty whose main focus is instruction and those that work primarily with non-traditional students. Control issues have arisen within the greater CATECS community, but Engineering Management faculty appear to genuinely appreciate the input and support of broadcast and programming specialists. Password protected web sites plus video tape distribution and collection procedures are used to limit distribution of course materials to authorized students and protect the University's intellectual property.

Course Content

Regardless of the course delivery technology and whether students are "traditional" or not, a program of instruction should adhere to certain principles of teaching and learning [Cyrs and Conway 1997]. The instructor must communicate expectations, be accessible to students, involve them in the learning process, promote cooperative learning, provide prompt feedback, and encourage contact outside of class. To achieve and maintain these principles, Engineering Management faculty use an array of technologies including e-mail, listserv, HyperNews, FAX, long distance and voice mail.

In addition, the instructor should help the students visualize course materials and should reinforce materials through analogy and metaphor [Gagne 1977 as cited in Markowitz 1990]. Video tape, CD, and the Internet provide powerful tools for dynamic visualization that are not available in traditional class room settings. In the Spring 1998 semester, props and "word pictures" [Cyrs and Conway 1997] were utilized in a product development course to aid in student visualization and create visual analogies for course concepts. Early anecdotal results suggest that students are responding favorably to these initiatives.

A complete learning experience will also provide the student with an opportunity to apply the new material and integrate it with existing knowledge [ibid.]. The majority of students in the Lockheed Martin Engineering Management Program are practicing engineers or technology managers. This provides students with "laboratories" for the application of course materials that are impractical for a university to provide.

Instructors must motivate students to attend to the course materials as they are being delivered. Interactive study guides [ibid.] are also being utilized in our product development course as a means of improving student attention and motivation. These guides originally met with mixed reviews from the students, but the students have been enlisted in revising standards for the guides with positive results. An example of such a guide is at http://www.colorado.edu/EngMgmtProg/ism/isg01.ppt

Another principle of teaching and learning is respect for student diversity and different learning styles [ibid.]. The options of live broadcast and video tape provide Engineering Management students with two alternatives for different learning styles. An expanded video-on-demand pilot via Internet and CD is scheduled for the Spring 1999 semester product development course. Though video delivery through these media generally results in lower resolution video, the main advantage is random access to course materials compared with the sequential access offered by video tapes.

In addition to technology demonstration, a key objective of the pilot program is to develop a consistent organization of instructional aids between lessons and between courses. Though the organization is likely to change as a result of lessons learned from the pilot, the initial organization scheme is presented here.

Each lesson includes a title or cover page stating the course name and/or number and the sequence number and/or date of the lesson within the course. The cover page includes hyperlinks to: the interactive study guide for the lesson, the table of contents for the lesson slides, and the first slide of the lesson. The cover page also includes hyperlinks to download any viewers or plug-ins required for the lesson and links to contact the instructor.

Each lesson is decomposed into slides. Slides are generally viewed sequentially, but the table of contents for each lesson facilitates non-linear review of the slides. Each slide includes four areas: the slide image in the lower left corner, an icon returning the user to the lesson cover page in the upper right corner, a horizontal navigation bar in the upper left corner, and a vertical tool bar in the lower right corner. The slide image presents the unique material to be covered at this point in the lesson, while the cover page icon, navigation bar and tool bar are intended to be consistent across slides, across lessons, and across courses. The navigation bar and tool bar are orthogonal [MacLennan 1983] since the navigation bar represents movement within the current lesson and the tool bar represents resources outside of the current lesson.

The navigation bar represents an ordinal scale [Agresti 1990]. The left-hand icon takes the student to an absolute location, the first slide in the lesson. The next icon takes the student to a relative location, the slide immediately preceding the current one. The middle icon on the navigation bar provides the "origin" for the ordinal scale; it takes the student to another dimension composed of additional multimedia resources that elaborate on the current slide. For example, the middle icon may take the student to a relevant video clip or simulation. The remaining two icons on the navigation bar are complementary to the first two icons. The fourth icon takes the student to the relative position of the slide immediately following the current one while the last icon on the navigation bar takes the student to the absolute position of the last slide in the lesson.

The tool bar represents a nominal scale [ibid.]. The top icon permits the student to contact the instructor via e-mail. The next icon provides the student access to the threaded course discussion list. Once the student has entered the threaded discussion area, (s)he can view discussion questions posed by the instructor, respond to discussion questions, view the responses of other students, or pose their own discussion question to the list. The bottom icon on the tool bar guides the student to the home page for the University of Colorado library system. Once there, the student can search for literature by title, author subject and keyword.

An example that illustrates the principles discussed in this section is available at http://www.colorado.edu/EngMgmtProg/ism/after.html.

Conclusion

Realizing the full potential of distance education for adult students requires that administration, faculty, specialists, students and technology work in concert. Technology capabilities, affordability and standards are still emerging. While waiting for the DE technologies to mature, education organizations should focus on streamlining administrative procedures and improving course content.

References

[Agresti 1990] Agresti, A. (1990), *Categorical Data Analysis*, New York: John Wiley & Sons.

[Bedensteiner 1989] Bedensteiner, J. (1989), A Profile of the Nontraditional College Student and Recommendations for Continuing Educators, *Continuing Higher Education Review*, 53 (2), 87-98, Washington D. C.: National University Continuing Education Association.

[Bevirt 1996] Bevirt, B. (1996), Designing Hypertext Navigation Tools, *WebNet 96 - World Conference of the Web Society Proceedings*, edited by Hermann Maurer, Association for the Advancement of Computing in Education, Charlottesville, VA. 1-6.

[Cyrs and Conway 1997] Cyrs, T. E. & Conway, E. D. (1997), *Teaching at a Distance with the Merging Technologies: An Instructional Systems Approach*, Las Cruces, NM: New Mexico State University.

[Gagne 1977] Gagne, R. M. (1977), *The Conditions of Learning*, New York: Holt, Rinehart & Winston.

[MacLennan 1983] MacLennan, B. J. (1983), *Principles of Programming Languages: Design, Evaluation, and Implementation*, New York: Holt, Rinehart & Winston.

[Markowitz 1990] Markowitz, H., Jr. (1990), *Distance Education: Staff Handbook*, Urbana-Champaign, IL: University of Illinois.

[Merriam and Brockett 1997] Merriam, S. B. & Brockett, R. G. (1997), *The Profession and Practice of Adult Education: An Introduction*, San Francisco, CA: Jossey-Bass Publishers.

[Moore 1993] Moore, J. F. (1993), Predators and Prey: A New Ecology of Competition, *Harvard Business Review*, May-June, 75-86, Boston, MA: Harvard Business School Publishing.

[Olcott 1996] Olcott, D. J., Jr. (1996), Aligning Distance Education Practice and Academic Policy: A Framework for Institutional Change, *Continuing Higher Education Review*, 60 (1), 27-41, Washington D. C.: National University Continuing Education Association.

[Porter 1997] Porter, L. R. (1997), *Creating the Virtual Classroom: Distance Learning with the Internet*, New York: Wiley.

[Sherron and Boettcher 1997] Sherron, G. T. & Boettcher, J. V. (1997), *Distance Learning: The Shift to Interactivity*, Boulder, CO: CAUSE.

[St. Pierre 1990] St. Pierre, S. (1990), Current Research Related to Instruction in Correspondence Study, *Continuing Higher Education Review*, 54 (2), 79-93, Washington D. C.: National University Continuing Education Association.

[Zemke and Zemke 1982] Zemke, R. & Zemke S. (1982), 30 things we know for sure about adult learning, *Adult Learning in Your Classroom: The best of TRAINING Magazine's strategies and techniques for managers and trainers*, 115-117, Minneapolis, MN: Lakewood Publications.